THE EFFECT OF ADSORPTION OF NEUTRAL AND IONIC SPECIES ON THE KINETICS OF REDUCTION OF OXYGEN AT PLATINUM ELECTRODES

S. Gilman and L. D. Sangermano

NASA/Electronics Research Center
575 Technology Square
Cambridge, Massachusetts 02139

ABSTRACT

The kinetics of electrochemical reduction of oxygen at platinum electrodes is sensitive to the presence of surface-active substances in solution. In acid solutions, the effect of anions and of organic substances is particularly pronounced while in alkaline solutions heavy-metal ions produce the most striking effects. Adsorption from acid solutions has received considerable attention over the past decade but few detailed studies have been performed in alkaline solutions. In the present investigations, the surface of a "clean" polycrystalline platinum electrode was characterized in KOH solutions by means of voltage-sweep techniques. Time effects were studied as a function of solution purity and as a function of controlled additions of carbonate and other common contaminants. Preliminary studies were made of the kinetics and thermodynamics of heavy-metal ion adsorption.